RADULÆ OF SOME SOUTH AUSTRALIAN GASTEROPODA.

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PLATES XIX. AND XX.

RACHIGLOSSA.

TROPHON FLINDERSI, Adams and Angas.

Pl. xix., No. 1, × 250.

Dental formula $\frac{1.1.1}{200}$. Radula translucent, thread-like. Central tooth with fine even strong cusps. Laterals single, large, and shaped something like a jawbone.

FASCIOLARIA AUSTRALASIA, Perry.

Pl. xix., No. 7, × 250.

Dental formula $\frac{1.1.1}{110}$. Radula very small compared with the size of the shell, rather translucent. Central tooth rectangular, with three small cusps, the middle one being double. Laterals very large, with ten strong cusps and one diminutive cusp closely adjoining the central tooth. Only the central and one lateral are drawn.

FASCIOLARIA FUSIFORMIS, Valenciennes.

Pl. xix., No. 2, × 250.

Dental formula $\frac{1.1.1}{156}$. Almost identical with *F. australasia,* in which the trifling difference, the doubling of the middle cusp of the central tooth, is only occasional.

TÆNIOGLOSSA.

CYPRÆA ANGUSTATA, var. *declivis,* Sowerby.

Pl. xix., No. 8, × 250.

Dental formula $\frac{2.1.1.1.2}{32}$. Teeth relatively large and coarse. Central tooth with one large cusp and a small one on each side, also two small cusps on its base. The laterals are tricuspid, the central cusp being large and blunt; in its great breadth the base is very similar to that of the central tooth. The marginals are very solid. The drawing given in Cooke, Shipley, and Reed's Cambridge Natural History, Molluscs and Brachiopods, 1895, p. 222, fig. 127, of *C. tigris*, Linné, shows no secondary cusps on the marginals.

RHIPIDOGLOSSA.

Megatebennus concatenatus, Crosse and Fischer.

Pl. xix., No. 3.

Dental formula $\frac{\infty.1.(4.1.4).1.\infty}{36}$. The central teeth consist of one broad median tooth with four smaller on each side, the fourth from the centre tooth having a truncated apex. The single lateral is very large, tricuspid, overlapping the centrals. The marginals represented by ∞ (infinity) in the formula, are in two rows, each of twenty-one very fine long teeth, serrated at their extremities and fixed at their base along one side of a triangular plate, the rows parallel to the side of the radula. This is bilaterally asymmetrical, and the chief characteristic is the huge size of the single lateral. Three specimens of small, medium, and large size had 40, 43, and 50 rows of teeth respectively, the number increasing with the growth of the animal, but not proportionally, as does the size of the individual teeth.

Lucapinella oblonga, Menke.

Pl. xix., No. 9, × 200.

Dental formula $\frac{\infty.1.(4.1.4).1.\infty}{65}$. Radula bilaterally asymmetrical, single lateral very large and very few marginals. Central teeth of nearly equal size, the top is more attenuated in the outermost one than in the others, the last two are peculiar in having a small flange which overlaps the next inner tooth near its base. The single lateral large and multicuspid. Two rows of marginals, long and serrated at their upper ends, and fixed at their bases along one side of an elongate rhomboidal plate run parallel to the length of the radula: each row has nine teeth.

Emarginula candida, H. Adams.

Pl. xix., No. 4, × 300.

Dental formula $\infty.1.(4.1.4).1.\infty$. Radula small, bilaterally asymmetrical. Median tooth of centrals broad; outermost tooth narrower than the three adjoining it, and with a flange overlapping the next inner tooth near its base. The single lateral, bicuspid, blunt, and larger than the centrals. Marginals, of two rows, each of twelve long fine teeth, serrated at the end, with their bases fixed to the side of a plate, through two parallel rows of minute plates, and parallel to the length of the radula. Dr. Paul Fischer (Man. de Conch., fig. 604, p. 859) regards the large plate to which the marginals are joined as an extra tooth.

Emarginula dilecta, A. Adams.

Pl. xix., No. 10, × 300.

Dental formula $\frac{\propto.1.(4.1.4).1.\propto}{48}$. Radula delicate, bilaterally asymmetrical. Middle tooth of centrals, broad; the outermost with two flanges. one overlaping the next inner tooth, the other extending behind the lateral. All the centrals have a very fine serrated edge like the teeth of a saw. The single lateral large and bicuspid. Marginals, in two parallel rows of seven each, with their bases attached to the outer side of a small plate, parallel to the length of the radula.

Phasianella australis, Gmelin.

Pl. xix., Nos. 5*a* and 5*b*, × 150.

Dental formula $\frac{\propto,5.1.5.\propto}{38}$. Radula very coarse, dark-red; details hard to see owing to its opacity. Central tooth narrow and inconspicuous. Five laterals rectangular, with a single blunt cusp; the three outer with a distinct flange lying behind the next inner tooth. Marginals with one remarkably developed cusp almost as large as their bases. The first marginal differs slightly from the rest in having its cusp smaller, with a second blunt one at its base, which fits into a socket in the second marginal. This second marginal has two of these small blunt cusps, and as the marginals diminish in size the number of these cusps increases till there are four or five, and at last are as large as the primary cusp which has gradually decreased. A separate figure (pl. xix., No. 5*a)* is given of the first three marginals, to show the intricate manner in which they interlock.

Phasianotrochus irisodontes, Quoy and Gaimard.

Pl. xix., No. 6, × 200.

Dental formula $\frac{\propto.1.(5+1+5).1.\propto}{43}$. Of the central teeth the middle one is peculiar in having a double flange at its base, and two small cusps on each side of the large cusp, which is broad and rounded at the end. The five adjoining central teeth have a large cusp with the two small cusps only on the side further from the middle tooth, and have a single flange on the outer side of the basal plate in front of the plate outside it. The single lateral is dwarfed in size and rudimentary in shape. The marginals have one cusp with a very fine serrated edge, and a long narrow base. They gradually decrease in size, and are very numerous.

MINOLIA PREISSIANA, Philippi.

Pl. xx., No. 1, × 300.

Dental formula $\infty.1.(5.1.5.).1.\infty$. Radula very fine and thread-like. Of the central teeth the middle tooth is broad and has a flange on each side of its base, the rest have each one cusp with a fine serrated edge and a single flange on its outer side: the outermost differs slightly from its fellows. The single lateral is small and simple. The marginals have long narrow bases, and two cusps, of which the larger has a serrated edge.

DOCOGLOSSA.

HELCIONISCUS LIMBATUS, Philippi.

Pl. xx., No. 11, × 250.

Dental formula $\frac{3.1.(1.1.1).1.3}{420}$. Radula of very great length, in coils. Three central teeth, the median tooth indistinct with a long cusp, the outer tooth has a single strong hook-like cusp, very dark in colour. The single lateral bicuspid, one large sharp cusp, and a minute one at its root. Marginals three, united, the two outer small and simple, the innermost with a small apical curled cusp: all have a small pointed cusp at their base.

PATELLA USTULATA, Reeve.

Pl. xx., No. 2, × 200.

Dental formula $\frac{1.1.(2.1.2).1.1}{96}$. Radula narrow, ribbon-like. Central teeth alike, with one large curved cusp on a narrow small base: the median tooth is the smallest. Single lateral transverse, plate-like, with four small unequal cusps. Marginal tooth small and simple. There are usually three marginals in this genus. Dr. Paul Fischer (Man. de Conch., fig. 610) shows no truly central tooth in *P. vulgata*, Linné, but three marginals. Cooke, Shipley, etc., *op. cit.*, fig. 131, show in *P. cretacea* the same number of central teeth, but only two marginals.

PATELLA ACULEATA, Reeve.

Pl. xx., No. 3, × 200.

Dental formula $\frac{3.1.(2.1.2).1.3}{180}$. Radula very long, cusps of central and lateral teeth of a deep-red horn colour. Median tooth of the five centrals slightly the largest; each has a large curved cusp nearly as big as its more transparent base. Single lateral transverse, plate-like, with four unequal cusps. Three marginals, with small cusps, and almost invisibly transparent.

Acmæa crucis, Tenison-Woods.

Pl. xx., No. 7.

Dental formula $\frac{0.0.(1.0.1).0.0}{73}$. Radula long, composed of a double row of oblong blocks in pairs, on each of which rests a central tooth, having a large curved cusp at its apex, and a small one at the base, both long and sharp. Fig 7*a* shows the blocks of cartilage; fig. 7*b* the teeth in profile.

Acmæa septiformis, Quoy and Gaimard.

Pl. xx., No. 9.

Dental formula $\frac{0.0.(1.0.1).0.0}{79}$. Radula practically identical with that of *A. crucis*, the cartilage blocks are shorter and denser, and the upper cusp is slightly larger.

Acmæa marmorata, Tenison-Woods.

Pl. xx., No. 8.

Dental formula $\frac{0\text{-}0.(1.0.1).0.0}{90}$. Radula very similar to that of *A. crucis*, but the upper and lower cusps are more nearly equal in size.

Acmæa subundulata, Angas.

Pl. xx., No. 10, × 300.

Dental formula $\frac{0.0.(1.0.1).0.0}{45}$. Radula very similar to that of *A. crucis*, the teeth and cartilage blocks are smaller, proportionally to the size of the respective shells.

BULLOIDEA.

Bulla australis, Gray.

Pl. xx., No. 12.

Dental formula 1.2.1.2.1. Radula shows a peculiar claw-like form of the central and lateral teeth. The single central occupies more than one-third of the row, having about eleven cusps on a long plate-like base in the form of a rake: any of them may be double, generally the central cusp is small, the adjoining two large, and the rest of gradually decreasing size. The laterals have each about seven cusps of varying size along the top of an irregular indistinct subtrigonal plate. The marginal is a simple non-cuspidate plate.

SIPHONARIOIDEA.

Siphonaria diemenensis, Quoy and Gaimard.

Pl. xx., No. 5, × 600.

Dental formula $\frac{21.18.1.18.21}{185}$. Radula relatively very broad, about 79 teeth in a row, about 14,615 altogether. Central tooth with a single sharp cusp on a long narrow bifurcated base very difficult to distinguish. Laterals 18, with a very long large cusp, on a short thick base: fig. 5*b* is a side view. The 21 marginals gradually diminish till extremely small. They are tricuspid, one cusp very large and blunt, and one very small on each side near its base. The basal plates of the marginals are small and indistinct. *S. tristensis,* Sowerby (fig. 278, Fischer's Man. de Conch.), shows a secondary small cusp on the laterals.

Siphonaria baconi, Reeve.

Pl. xx., No. 4, × 450.

Dental formula $\frac{19.13.1.13.19}{88}$. Radula broad, yellowish. Central tooth with one cusp on a long narrow bifurcated base. Laterals 13, with one very large blunt cusp on a small base. It is rather difficult to determine where the marginals begin, but there are about 19, tricuspid with one large median cusp and two small ones on a very diminutive base. They gradually decrease in size to a small rectangular plate with a tiny abutment on the lower side.

Gadinia angasi, Dall.

Pl. xx., No. 6, × 1000.

Dental formula $\frac{30.0.1.0.30}{100}$. Radula delicate, teeth extremely small. Marginals and laterals are so alike that they have been grouped together as 30 marginals. Central tooth with one dark, pointed cusp on a slightly broader base. Marginals bicuspid, with one very long sharp cusp and a minute one, fixed to a small basal plate (in profile in fig. 6*b).* The teeth gradually lessen in size, and become shapeless. The large tusk-like apearance of the big cusp of the marginals is a striking feature.

EXPLANATION OF PLATES.

Plate XIX.

1. Radula of *Trophon flindersi,* Ads. and Ang.
2. ,, *Fasciolaria fusiformis,* Valenciennes.
3. ,, *Megatebennus concatenatus,* Crosse and Fischer.
4. ,, *Emarginula candida,* H. Adams.
5*a*. ,, *Phasianella australis,* Gmelin; also 5*b*.
6 ,, *Phasianotrochus irisodontes,* Quoy and Gaimard.
7. ,, *Fasciolaria australasia,* Perry.
8. ,, *Cypræa angustata,* var. *declivis,* Sowerby.
9. ,, *Lucapinella oblonga,* Menke.
10. ,, *Emarginula dilecta,* A. Adams.

PLATE XX.

1. Radula of *Minolia preissiana*, Philippi.
2. ,, *Patella ustulata*, Reeve.
3. ,, ,, *aculeata*, Reeve.
4 ,, *Siphonaria baconi*, Reeve.
5. ,, ,, *diemenensis*, Quoy and Gaimard.
6. ,, *Gadinia angasi*, Dall.
7. ,, *Acmœa crucis*, Tenison-Woods.
8. ,, ,, *marmorata*, Tenison-Woods.
9. ,, ,, *septiformis*, Quoy and Gaimard.
10. ,, ,, *subundulata*, Angas.
11. ,, *Helcioniscus limbatus*, Philippi.
12. ,, *Bulla australis*, Gray.